Care and Feeding = Project Success

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Synopsis

- **This presentation highlights a case of a struggling project whose third (and final) Project Manager applied integrated project management to bring the project to a position of success**

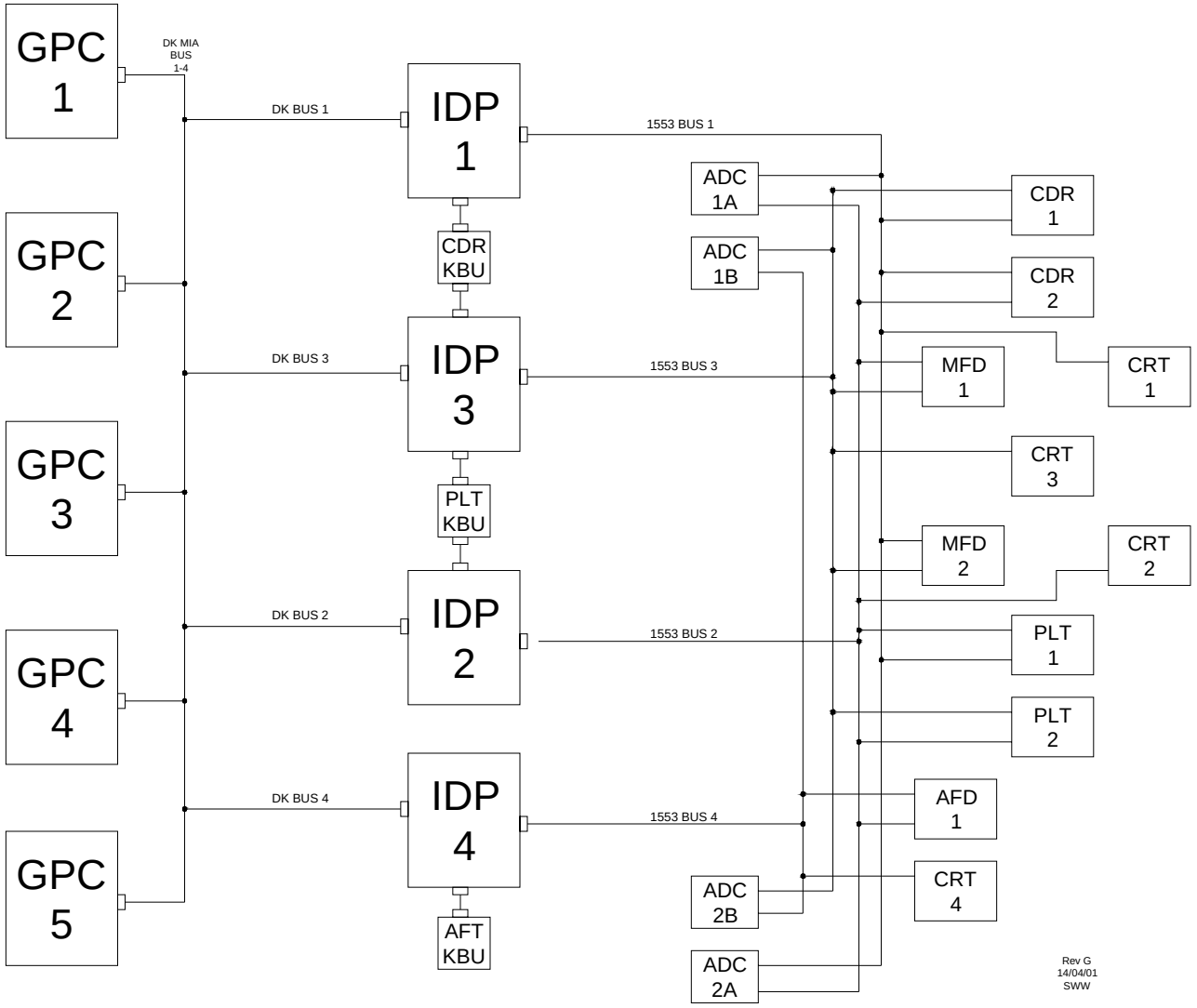
- **This case study demonstrates**
  - **The power of integrated project management in setting and keeping a complex project on a successful track**
  - **The key to success that comes from the Project Manager's personal attention to the project planning and performance components and their application for integrated project management**

Project was top managed NASA program in 2004 GAO study

Project Background

- **The Cockpit Avionics Upgrade (CAU) was a highly complex Space Shuttle upgrade involving:**
  - **2 new avionics flight hardware boxes**
    - **New command and display processor**
    - **New interface box to existing onboard flight computers**
  - **Extensive new flight software**
    - **New operating system; all new flight crew displays; new abort determination software**
  - **Integration into existing flight and ground systems**
    - **New technology cabling in the Orbiters for greater processing requirements**

Shuttle Hardware Architecture



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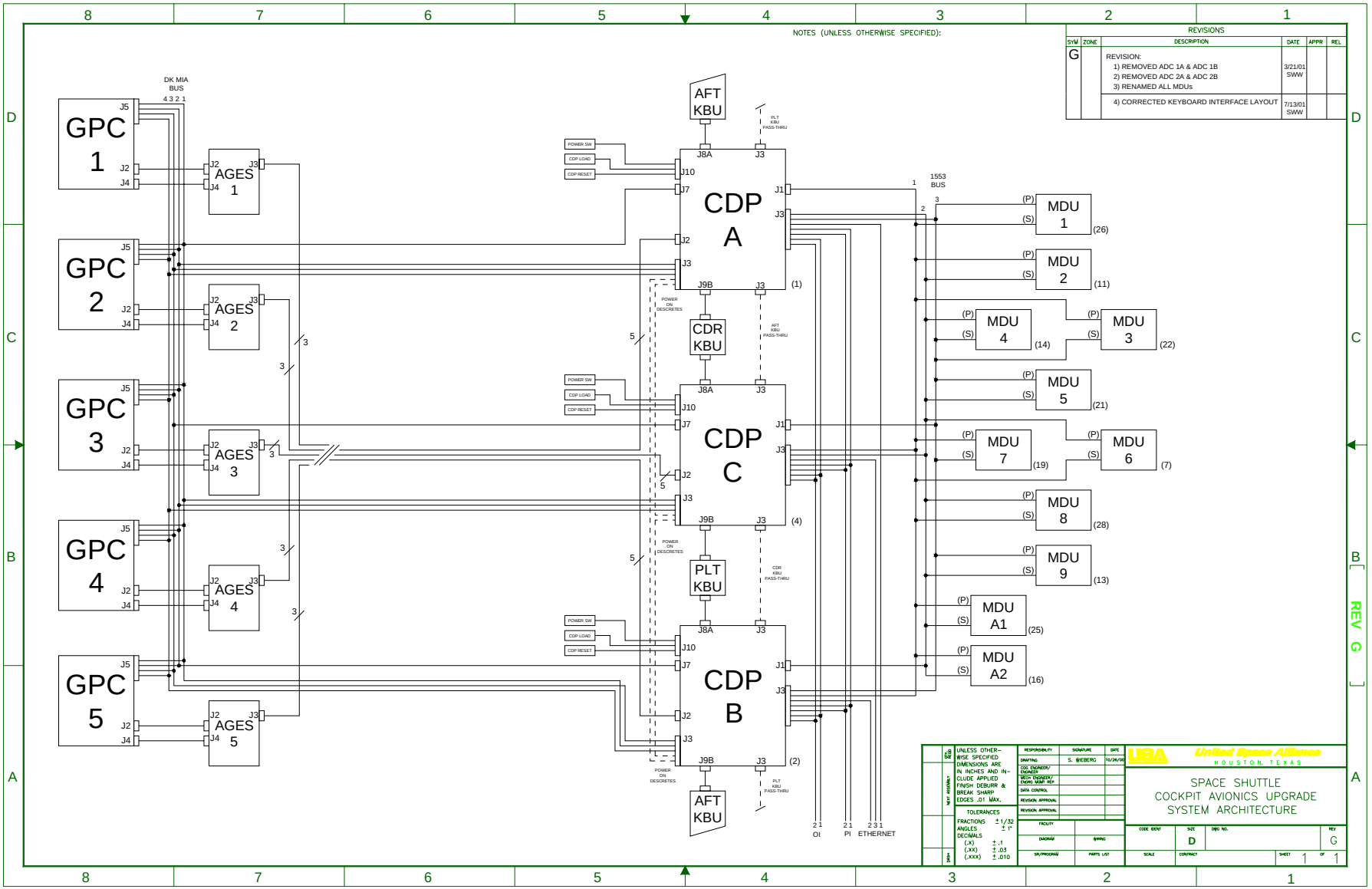
CAU Hardware Architecture



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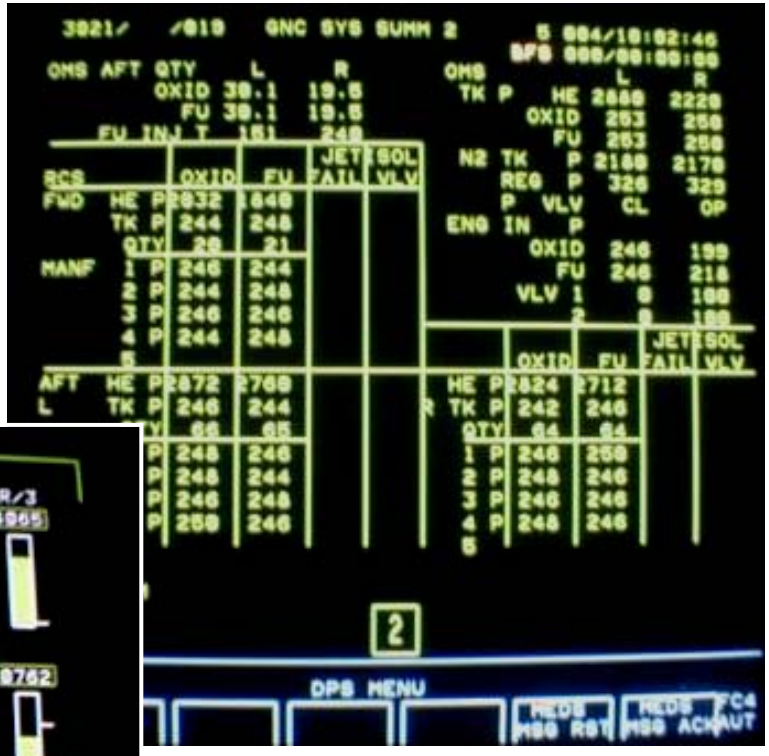
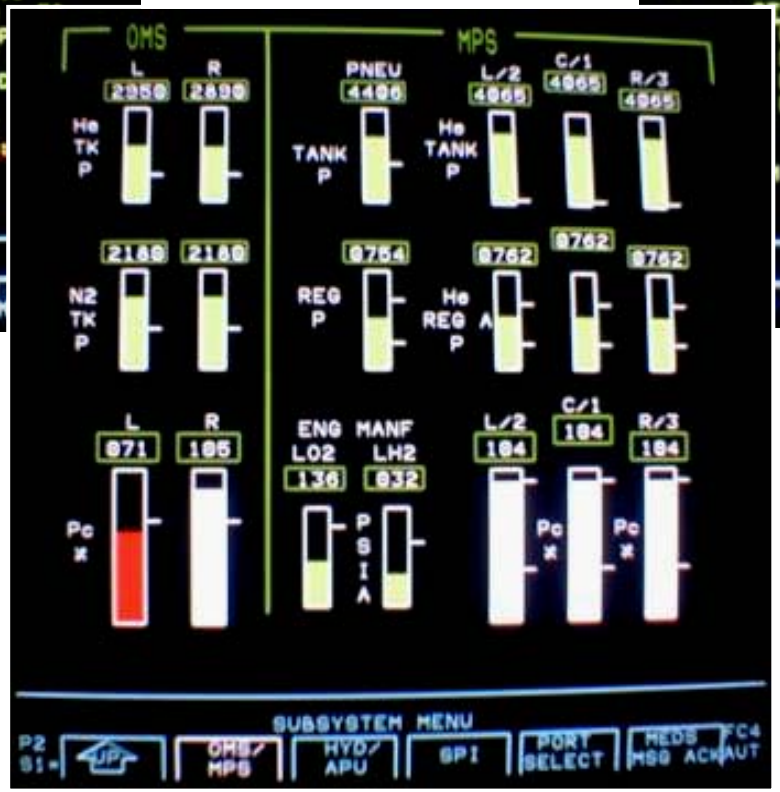
Legacy Displays for Maneuvering Engine Burn





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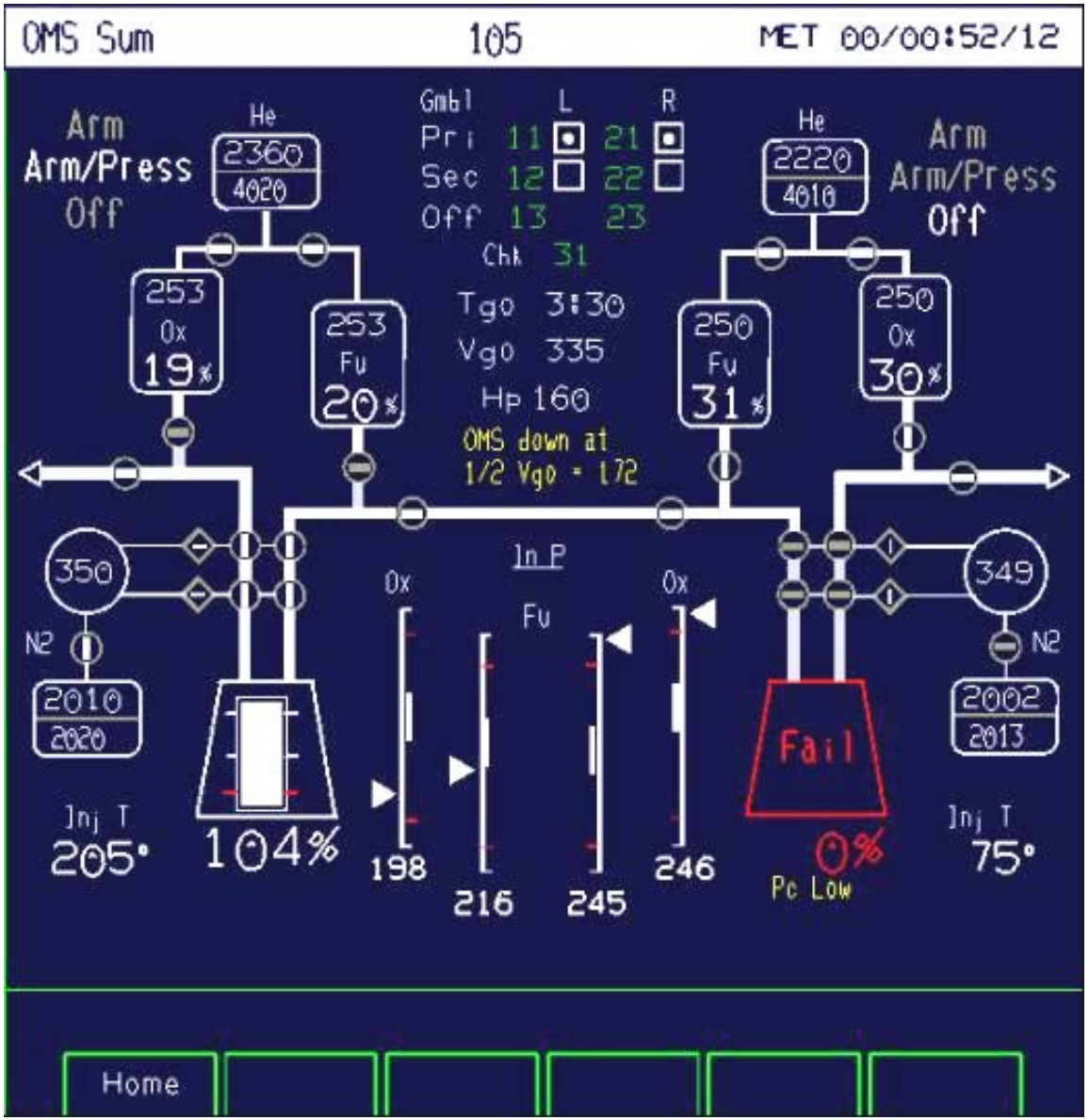
CAU Display for Maneuvering Engine Burn



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Project Challenges…

- **Aggressive Schedule**
  - **Initial concept in 1999, Authority To Proceed in 2001, first flight in 2006**
- **Emphasis on Commercial Off The Shelf (COTS) products**
  - **Must be certified for space environment**
- **New development in a long-standing operational environment**
- **Heavy use of matrixed resources; multiple contractors; multiple geographical locations**

By late 2001, significant project issues had already warranted 2 internal special reviews

…Project Challenges

- **Both special reviews determined:**
  - **Processes that were lacking or not well understood/acknowledged**
    - **Configuration Management (CM)**
    - **Integrated Product Teams (IPTs)**
    - **Earned Value (EV)**
    - **Risk Management (RM)**
  - **Aggressive schedule/lack of schedule buy-in by team members**
  - **Some lead roles missing or key skills overtaxed**
  - **Requirements in flux or not stabilized by need date(s) for schedule dependencies**
  - **Communications lacking**
    - **Between matrixed management and to employees and with subcontractors**

And so,

the new Project Manager (PM) is assigned…..

Systems Engineering and Integration (SEI)

Situation

- SEI was being purchased from another department
- System Engineer was purchased labor employee trying to be one person SEI team

Solution

- Assigned highly experienced full time System Engineer
  - Reporting to and fully empowered by PM
- Established full SEI IPT
  - Responsible for all processes, requirements, and technical issues
  - Overarching subsystem IPTs – clearly endorsed by PM

SEI is the PM's "right hand" – PM must clearly establish, empower, and utilize

Integrated Product Teams (IPTs)

Situation

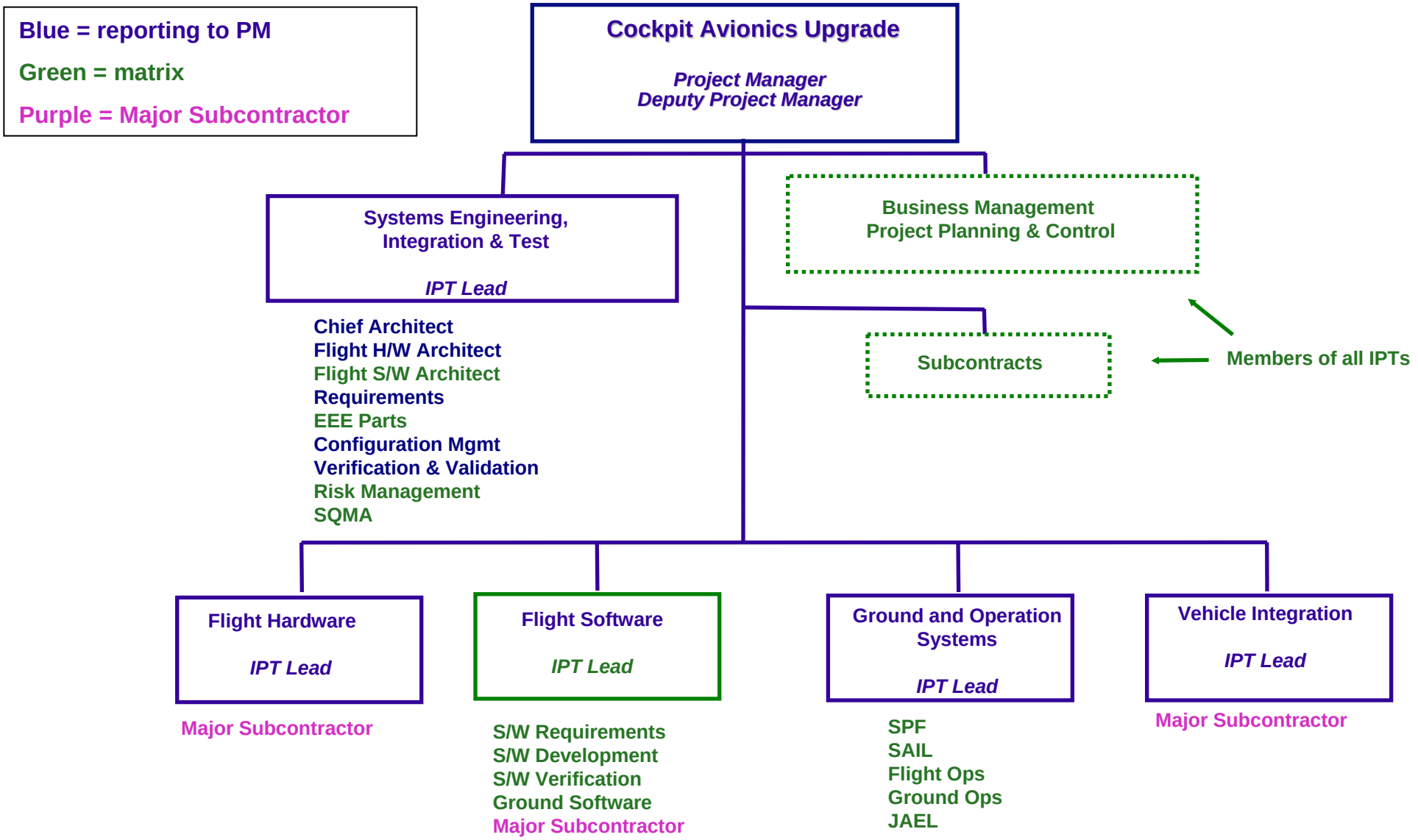
- Matrixed personnel did not acknowledge the role and authority of the IPTs

Solution

- Trained entire team on IPTs
- Replaced IPT Leads as needed
  - Focus on combination of technical and leadership skills
- Continuous PM attention to IPT Leads
- PM one-on-ones with matrixed personnel management

Team is key in IPT – PM serves as leadership counsel to IPT Leads

Integrated Product Team Structure



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Integrated Cost and Schedule

Situation

- Historical environment as primarily level of effort – schedule and cost essentially managed separately

Solution

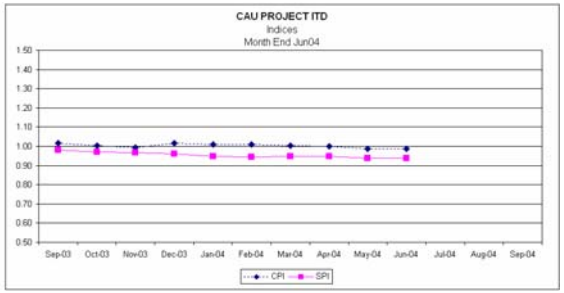
- PM established expectation of comprehensive integrated cost and schedule
- Provided team of experienced planners and schedulers
- PM held in-depth reviews of integrated plans at lowest level control accounts
  - PM able to talk entire Integrated Master Schedule and resource plans

PM ensures aggressive yet achievable plans – and sets level of importance

Earned Value Management (EVM)

Situation

- First application of full EVM in company
  - And to a certain extent, for the customer



Solution

- Training; more training; after a while, some more training
- Provided team of experienced financial analysts
- PM held comprehensive monthly variance reviews
  - PM active in generation of Cost Performance Reports
- PM held in-depth annual Estimate At Complete reviews

PM personal attention to EVM enables maximum insight to project performance

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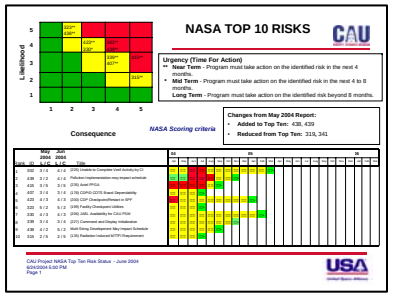
Comprehensive Risk Management (RM)

Situation

- RM process not rigorous; being loosely administered
- Risks not adequately addressing integrated technical, cost and schedule impacts

Solution

- Assigned highly experienced full time RM lead
- Established clear, project-specific evaluation criteria
  - Open encouragement to identify risks – never a negative reaction!
- PM held comprehensive monthly risk reviews
  - Required all IPTs to be represented for entire review



PM support and endorsement of RM is vital to early identification and abatement of risks

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Embedded Subcontractor Management

Situation

- Major hardware vendor was operating almost autonomously
  - Disconnect complicated by remote location

Solution

- Assigned on-location site representative; augmented with rotating support
- Made Subcontract Management (Procurement) active members of IPTs
- PM established strong and regular communications with vendor's senior management

Engaged PM relationship with suppliers facilitates performance expectations and issue resolution

Communications

Situation

- **So when is communications NOT a concern?**
  - **Complicated by large extent of matrixed resources; multiple contractors; multiple geographical locations**

Solution

- **Lots of attention from the PM**
  - **Monday morning tag-ups with IPT Leads; with "PM Notes" handouts**
  - **Regular "All Hands" with entire project team**
  - **Frequent emails to entire project team**
  - **Standing tag-ups and open lines of communications with managers**

PM is the role model for open and frequent communications – goal is no mushrooms!

Employee Recognition

Situation

- Very large team working with lots of challenges and frequent controversies
- Matrixed personnel often overlooked in recognitions

Solution

- Frequent and visible recognitions from the PM for entire team
  - Goal of one major after-work party per quarter
  - Additional social opportunities and refreshments
- Maximum use of company awards programs
  - Including subcontractor recognitions

Work hard, play hard - PM sets the tone

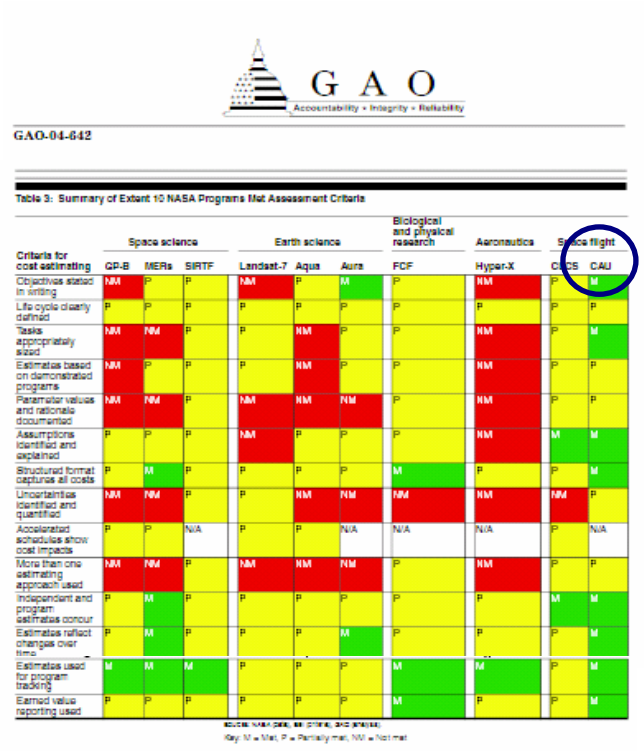
Flexibility, Creativity, and Teamwork!

- **Application of all these elements of Project Management, led by the PM, established:**
  - **Solid plans and processes bought into by the team**
    - **SEI, IPTs, Integrated Cost & Schedule**
  - **Early identification of issues**
    - **EVM, RM**
  - **A very strong project team**
    - **IPTs, Subcontracts, Communications, Recognition**

- **As a result, when development issues hit, the team was able to respond in creative and flexible ways**
  - **Give and take across IPTs to find common project solution**
  - **Full and rapid understanding of solution ramifications to project plans**

Project Considered Successfully Managed

- **In 2004, the General Accounting Office analyzed 27 NASA programs for cost management processes and effectiveness**



GAO

Accountability • Integrity • Reliability

GAO-04-642

Table 3: Summary of Extent 10 NASA Programs Met Assessment Criteria

Criteria for cost estimating	Space science			Earth science			Biological and physical research	Aeronautics	Space flight	
	GP-B	MERs	SIRTF	Landsat-7	Aqua	Aura	FCF	Hyper-X	CEGS	CAU
Objectives stated in writing	NM	P	P	NM	P	M	P	NM	P	M
Life cycle clearly defined	P	P	P	P	P	P	P	P	P	P
Tasks appropriately sized	NM	NM	P	P	NM	P	P	NM	P	M
Estimates based on demonstrated programs	NM	P	P	P	NM	P	P	NM	P	P
Parameter values and rationale documented	NM	NM	P	NM	NM	NM	P	NM	P	P
Assumptions identified and explained	P	P	P	NM	P	P	P	NM	M	M
Structured format captures all costs	P	M	P	P	P	P	M	P	P	M
Uncertainties identified and quantified	NM	NM	P	P	NM	NM	NM	NM	NM	P
Accelerated schedules show cost impacts	P	P	N/A	P	P	N/A	N/A	N/A	P	N/A
More than one estimating approach used	NM	NM	P	NM	NM	NM	P	NM	P	P
Independent and program estimates concur	P	M	P	P	P	P	P	P	M	M
Estimates reflect changes over time	P	M	P	P	P	M	P	P	P	M
Estimates used for program tracking	M	M	M	P	P	P	M	M	P	M
Earned value reporting used	P	P	P	P	P	P	M	P	P	M

Key: M = Met, P = Partially met, NM = Not met

Of 10 programs evaluated in detail, CAU was the best

CAU rated as the top managed NASA program

Summary

- **Application of the suite of project management tools and techniques in an integrated manner was vital in restoring the project to an achievable plan and seeing it into successful performance despite the typical new development challenges**

- **The key to the equation for success is the Project Manager's personal attention to the project planning and performance components and their integrated use for project management**

Care and Feeding = Project Success